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A NEW, LIGHTWEIGHT, TRANSPARENT INSECT CAGE

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ABSTRACT

A transparent, lightweight cylindrical cage for confining insects on plants is described. The cage, constructed of medium-impact vinyl, is ventilated with several mesh-covered ports and has a removable, ventilated lid. The cage is equally suitable for confining insects on branches of plants or on entire small plants.

KEYWORDS: Cages, Citrus plantings, Insect handling, Laboratory equipment.

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Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE
In Cooperation With
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A NEW, LIGHTWEIGHT, TRANSPARENT INSECT CAGE

By H. D. Pierce[1]

INTRODUCTION

During tests of insects as possible vectors of *Spiroplasma citri*, the causative agent of stubborn disease of citrus, a versatile, lightweight (18.2 g) cylindrical cage was developed that can be used for feeding insects on small plants or on branches of larger plants (fig. 1). Such cages were constructed in the laboratory with little special equipment.

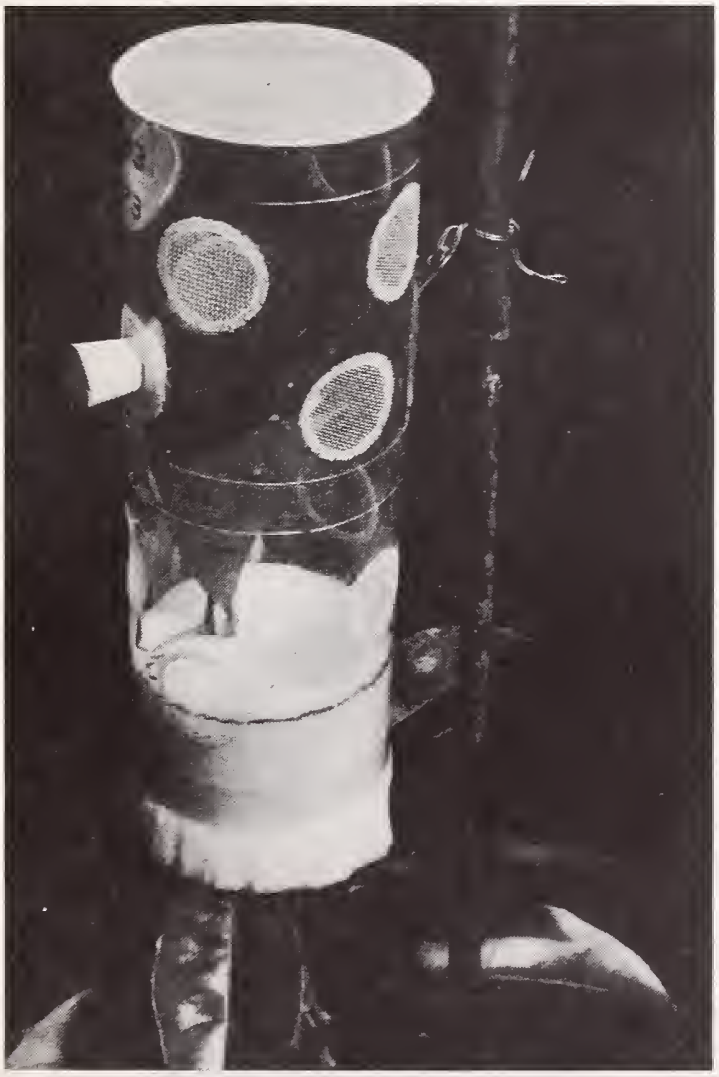

Figure 1.--Insect cage in place on citrus plant.

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MATERIALS AND METHODS

Medium-impact vinyl, 0.10 mm thick, proved to be an excellent, lightweight, highly stable material for cage construction. IPS Weld-on 1687, which requires only a few seconds bonding time, was used as an adhesive. Most of the cages currently in use at our laboratory are 17.78 cm high by 6.25 cm in diameter, but dimensions can be modified to fit individual needs. The required materials include: Clear vinyl sheet, 0.10 mm thick; Plexiglas tubing for forming the cage body; plastic foam, 5.8 cm thick; vinyl cement; material for covering the ventilation holes; and a hobby-craftsman cement gun for easy application of small amounts of cements in tight working areas.

The cage may be constructed as follows: Make a cardboard pattern of the size desired. Cut out ventilation ports. Cut the vinyl sheet according to the pattern. Mark the locations for ventilation ports (fig. 2*A*, *B*) and cut them

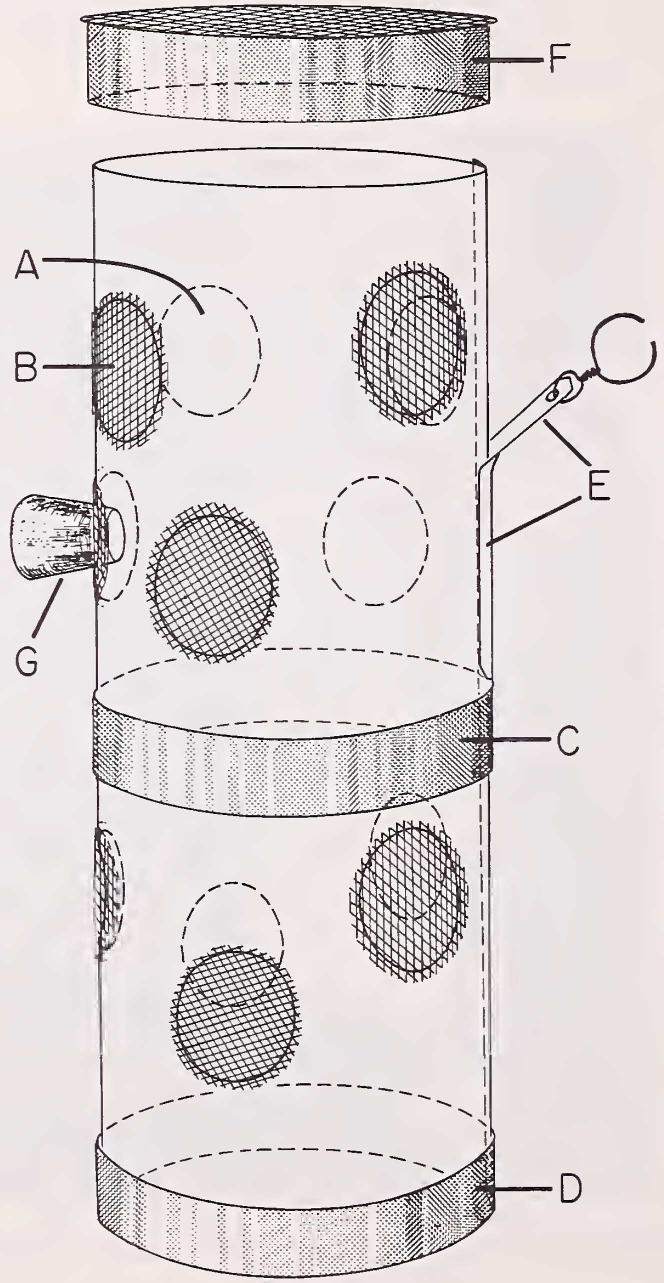

Figure 2.--Drawing of cage showing: *A*, Outline of ventilation port; *B*, ventilation port covered with screen; *C*, middle reinforcement band; *D*, bottom reinforcement band; *E*, support hanger; *F*, cage lid; and *G*, cork plug for port.

with a No. 12 brass cork borer. Wrap the vinyl around a 30.48-cm length of Plexiglas cylinder with 6.35 cm OD. Form the vinyl into a cylinder, and fasten it in that shape by applying a thin bead of cement to the inside and outside overlaying edges. (A 1.27-cm overlay is recommended.) Firmly press the weld until dry. Use a minimum of cement to prevent distortion or warping. Drying takes only a few seconds. Next, cement the reinforcement bands (fig. 2*C*, *D*) into position by applying a thin bead of cement to both edges of each band and wrapping the band around the cage. Position these bands so their overlay weld is on the opposite side from the cage seam to give maximum strength to the cage wall. Glue the ventilation port covers (which can be easily cut with an arch punch) in place with vinyl cement. The covers should be 0.32 cm larger in diameter than the ports. Use cotton organdy, Nytex, or plastic screen for covers, depending upon the size of the insect to be caged. A curved-nosed forcep and a dissecting needle are helpful in placing the covers. Then, bond to the outside seam a support hanger (fig. 2*E*) (an extra piece of vinyl for fastening the cage to a rigid support such as a plant stake), consisting of a 5.08- by 1.27-cm strip, two layers thick. Bend one end of the hanger (about 1.3 cm long) to a 45° angle, and punch a hole in it for fastening to the plant stake with a small copper wire. After the cage bodies are complete, place them on a long, Plexiglas form for 24 hours to allow thorough drying and prevent warping.

The lid (fig. 2*F*) of the cage consists of a collar of vinyl and either plastic screen or vinyl plastic. Make the collar by wrapping a band of vinyl 21.59 by 1.27 cm around the Plexiglas cylinder used in building the cage. In this case, wrap masking tape around the Plexiglas so that when the collar is glued in place its diameter will be slightly larger than that of the cage. (The precise diameter is controlled by the amount of tape used.) After the band is dry, slip it off the taped Plexiglas cylinder just enough to allow the lid covering to be firmly glued in place. Cement the lid covering to the collar first, and then trim off excess material. (Because vinyl cement will not adhere to polyethylene or Plexiglas, there is no danger that either part will stick to the cylinder.) Then bond the lid covering to the lid collar by turning the mold over, with attached collar, and cementing aroung the outside edge. The lid top (if made of vinyl) may also be fitted with ventilation ports.

The cage may be used to cover small plants, and its lower end can be pressed into the soil, or it may be attached around the main stem or branch of larger plants. The latter is done by constructing a plug from plastic foam (about 5.8 cm thick and slightly larger than the diameter of the cage) and cutting the plug one-half way through its diameter to permit it to be tightly wrapped around the stem or branch and fitted within the end of the cage. A small piece of cotton wrapped around the plant at the point where the plug is fitted will help seal this point and confine very small insects. When the cage is used to cover the entire plant, it may be supported by one or more plant stakes thrust into the soil and sealed at the base by applying silica sand around its base. When insects are to be placed in the cage or removed, a small cross cut is made in a ventilation port, and this plugged with a cork (fig. 2*G*). I usually use a curved glass pipet aspirator to transfer insects to and from the cage.

DISCUSSION

The materials used for the cage have not been toxic to the insects. On the contrary, some caged Cicadellidae (for example, *Scaphytopius nitridus* (DeLong)) have survived as long as 100 days in the greenhouse. We have even used the cage successfully in southern California deserts during the summer when we have provided some shading. With reasonable care, the cages may be expected to last for several years. They can be quickly repaired by applying patches or simply regluing. A light rinsing in water and brushing with a bottle brush are all that is normally required for maintenance.

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